

Name: _____

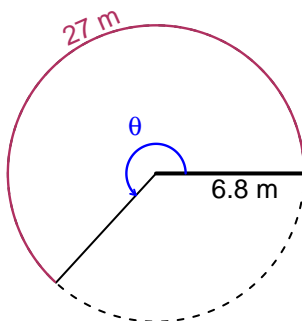
Date: _____

Trig Final (SLTN v645)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 27 meters. The radius is 6.8 meters. What is the angle measure in radians?

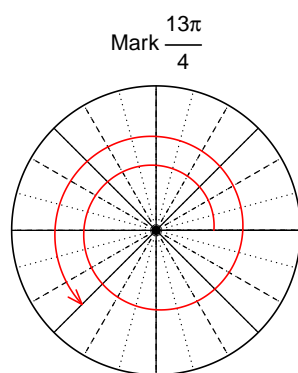


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$$\theta = 3.971 \text{ radians.}$$

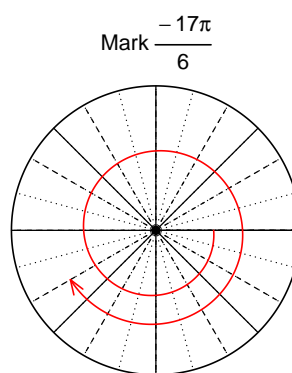
Question 2

Consider angles $\frac{13\pi}{4}$ and $-\frac{17\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{13\pi}{4}\right)$ and $\sin\left(-\frac{17\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(13\pi/4)$

$$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$$



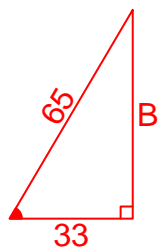
Find $\sin(-17\pi/6)$

$$\sin(-17\pi/6) = \frac{-1}{2}$$

Question 3

If $\cos(\theta) = \frac{33}{65}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

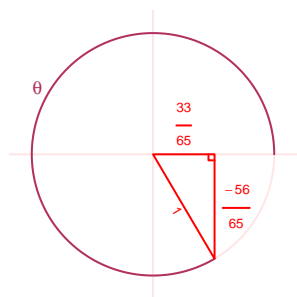
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}33^2 + B^2 &= 65^2 \\ B &= \sqrt{65^2 - 33^2} \\ B &= 56\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-56}{65}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 6.09 Hz, a midline at $y = -3.76$ meters, and an amplitude of 2.1 meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 2.1 \cos(2\pi 6.09t) - 3.76$$

or

$$y = 2.1 \cos(12.18\pi t) - 3.76$$

or

$$y = 2.1 \cos(38.26t) - 3.76$$